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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/074,888	02/13/2002	Benjamin C.E. Schwarz	5298-06900 PM01027	6502
35617	7590	07/23/2004	EXAMINER	
CONLEY ROSE, P.C. P.O. BOX 684908 AUSTIN, TX 78768			DEO. DUY VU NGUYEN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 07/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/074,888	<b>Applicant(s)</b> SCHWARTZ ET AL.	
	<b>Examiner</b> DuyVu n Deo	<b>Art Unit</b> 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 28-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 28-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1, 4-8, 11, 29, 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Keil et al. (US 6,630,407).

Keil describes an etching method comprising: etching a stack of layers within a single etch chamber (col. 2, line 18-30, 44-45), the layers comprises an organic ARC layer, a nitride layer arranged beneath and in contact with the ARC layer, and underlying layer beneath the

nitride layer. Argon is introduced during etching of the ARC (col. 2, line 39, 40). This would read on claimed a noble gas heavier than helium is introduced into the chamber during the etching.

Referring to claim 11, the etching reactor includes inductively coupled plasma reactor (col. 2, line 23), which is also a low-density plasma etch chamber (please see cited art below).

Referring to claim 29, even though Keil is silent about the etching chemistry for the nitride layer is different than the etch chemistry for the ARC layer. Since the ARC etch chemistry is tailored so that it would etch the ARC selectively to the under layer including the nitride layer (col. 2, line 5-10), the nitride must be etched by another different chemistry.

Referring to claim 30, since the nitride layer is exposed as the ARC is being etched away, some of the nitride layer (claimed a portion of the nitride layer) would also be etched away.

Referring to claims 7, 8, the underlying layer can comprise polycrystalline silicon (col. 5, line 14).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 9, 10, 28, 32, 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keil.

Referring to claim 32, even though Keil doesn't describe the etching the underlying layer with an etch chemistry different than that of the first and second chemistries. However, he suggests to etch the ARC selectively to other layers as described above, it would have been obvious to one skilled in the art to etch the underlying layer selectively to other layers. This would provide an etching that is different to the first and second etching chemistries since these layers are different layers.

Referring to claim 35, the underlying layer can comprise metals, which would form claimed interconnect line and they have dimension within a CD specification (col. 1, line 60-65; col. 5, line 5-17).

Referring to claims, 9 and 10, at the time of the invention, it would have been obvious to one skilled in the art that the underlying can be monocrystalline silicon or silicon-germanium depending on the device being manufacturing since Keil suggests that the underlying layers can be semiconductor layer (col. 5, line 14).

Referring to claim 28, Keil suggests the Ar flow rate is 50-500 sccm (col. 8, line 46) and he teaches that the gas flow rate depends on the size of the substrate, type of plasma reactor, power settings, etc. (col. 8, line 65-col. 9, line 3); therefore, it would have been obvious to determine the Ar flow rate through routine experimentation depending on the above parameters in order to provide optimum Ar flow rate with a reasonable expectation of success.

5. Claims 2, 3, 12-17, 31, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keil as applied to claims 1, 11, 29, 32 above, and further in view of Roberts et al. (US 5,626,775).

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Referring to claims 2, 3, 12, 14, 17, 31, 33, using noble gas during etching is well known to one skilled in the art as shown here by Roberts. He teaches that using high ionization gases such as Ar (claimed noble gas heavier than helium) would be used as carrier gas and enhances and stabilizes the plasma medium during etching (col. 5, line 25-30).

Referring to claim 15, Keil further shows a pattern photoresist layer arranged over the ARC before etching the ARC and removing the remaining of the photoresist and the ARC layers subsequent to etching the cap nitride layer (col. 5, line 42-53).

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Keil as applied to claim 11 above, and further in view of Khajehnouri et al. (US 6,117,786).

Referring to claim 18, Keil doesn't describe using the noble gas such as xenon. However, using carrier gas such as xenon is known as a carrier gas in the etching process of semiconductor devices as shown here by Khajehnouri (col. 2, line 18-20). Therefore at the time of the invention, using xenon would be obvious to one skill in the art in order to provide a carrier gas for the etching process with a reasonable expectation of success.

7. Claims 34 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keil as applied to claim 32 above, and further in view of Lim et al. (US 6,403,484).

Referring to claims 34, since Keil suggests the underlying layer can be different kind of layers including semiconductor layers and this would form different type of device including claimed forming dielectric material in the opening of the underlying layer to form isolation structure. This process of forming isolation structure is well known to one skilled in the art at

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the time of the invention as shown here by Lim (col. 3, line 4-14), who also shows forming the nitride by thermal growing is a process practiced by one skilled in the art at the time of the invention (col. 3, line 38-40). Therefore, it would have been obvious to one skilled in the art that an isolation structure can be formed in light of Keil and Lim with a reasonable expectation of success.

8. Hung et al. shows prior art (col. 3, line 35; col. 4, line 31-33).

***Response to Arguments***

9. Applicant's arguments with respect to claims 1-18, 28-36 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Rejections - 35 USC § 112***

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1 recites the limitation "the nitride layer." There is insufficient antecedent basis for this limitation in the claim.

At this time the nitride layer would be understood as "a nitride arranged beneath and in contact with the antireflective layer"

***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6:00-3:30; with alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DVD  
7/19/04

